270101

FLOOD INSURANCE STUDY

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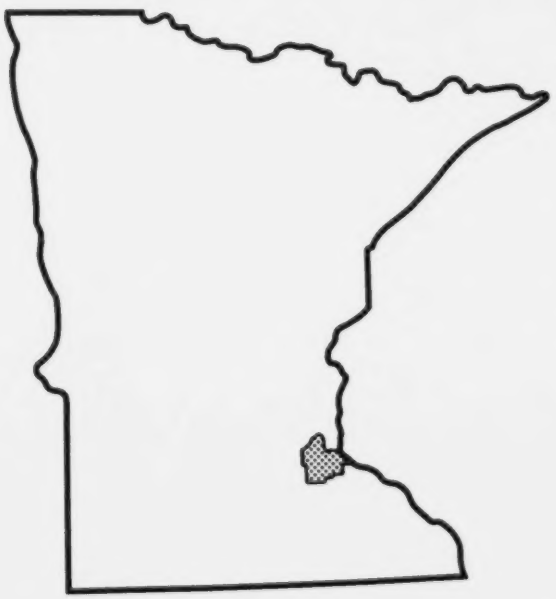
COUNTY OF DAKOTA
MINNESOTA
UNINCORPORATED AREAS



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Flood Boundary and Floodway Map

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index
Flood Insurance Rate Map

FLOOD INSURANCE STUDY

COUNTY OF DAKOTA, UNINCORPORATED AREAS, MINNESOTA

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the unincorporated areas of Dakota County, Minnesota, and to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert the unincorporated areas of Dakota County to the regular program of flood insurance by the Federal Insurance Administration. Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.1 (d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Coordination

Study coordination meetings were held with county officials between January 1976 and June 1977 to define the areas to be studied, to provide the county an opportunity to review flood elevations, and to determine a floodway consistent with the county's development, goals, and objectives.

A search for basic data was made at all levels of government. Dakota County provided written and oral commentary on land use development trends, the current status of land use planning characteristics of areas within the county, flood control measures, and major flood related problems.

The Minnesota Department of Natural Resources provided valuable advice and assistance throughout the study, particularly with regard to flood plain management implications relating to the Flood Insurance Program. The U.S. Geological Survey (USGS) and the U.S. Army Corps of Engineers (COE) provided hydrologic data relating the streamflows of the Mississippi and Cannon Rivers. Streamflow records on the Mississippi River and the Cannon River are published annually by the USGS. The Soil Conservation Service

(SCS) provided the hydrologic data for the Vermillion River. Base maps were obtained from the USGS. Flood discharges used in this study were coordinated with the COE, the USGS, the SCS, and the Minnesota Department of Natural Resources. On May 14, 1980, the results of the study were reviewed and accepted at a final coordination meeting attended by representatives of the above-mentioned groups.

1.3 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were performed by Howard, Needles, Tammen & Bergendoff for the Federal Insurance Administration, under Contract No. H-3984. This work, which was completed in April 1978, covered all significant flooding sources affecting the unincorporated areas of Dakota County.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the unincorporated areas of Dakota County. The area of study is shown on the Vicinity Map (Figure 1).

The areas studied by detailed methods were selected with priority given to all known flood hazard areas, and areas of projected development or proposed construction until April 1979.

Approximate methods of analysis were used to study those areas having low development potential and/or minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by the Federal Insurance Administration and the unincorporated areas of Dakota County.

The following streams were studied using detailed methods: the Cannon River from the southeastern county boundary upstream to the Northfield corporate limits; the Vermillion River for its entire length within Dakota County; Unnamed Creek in the unincorporated hamlet of Etter. Those portions of the Vermillion and Mississippi Rivers from the Hastings corporate limit southeast to the county boundary, and the Mississippi River northwest from the Hastings corporate limit to the Rosemount corporate limit were detailed study areas based on historical data; no cross sections were taken (References 1, 2, 3, and 4). Approximate methods were utilized to evaluate the following streams: Chub Creek and its tributaries; Pine Creek and its tributaries; the Mississippi River from the northwest Hastings

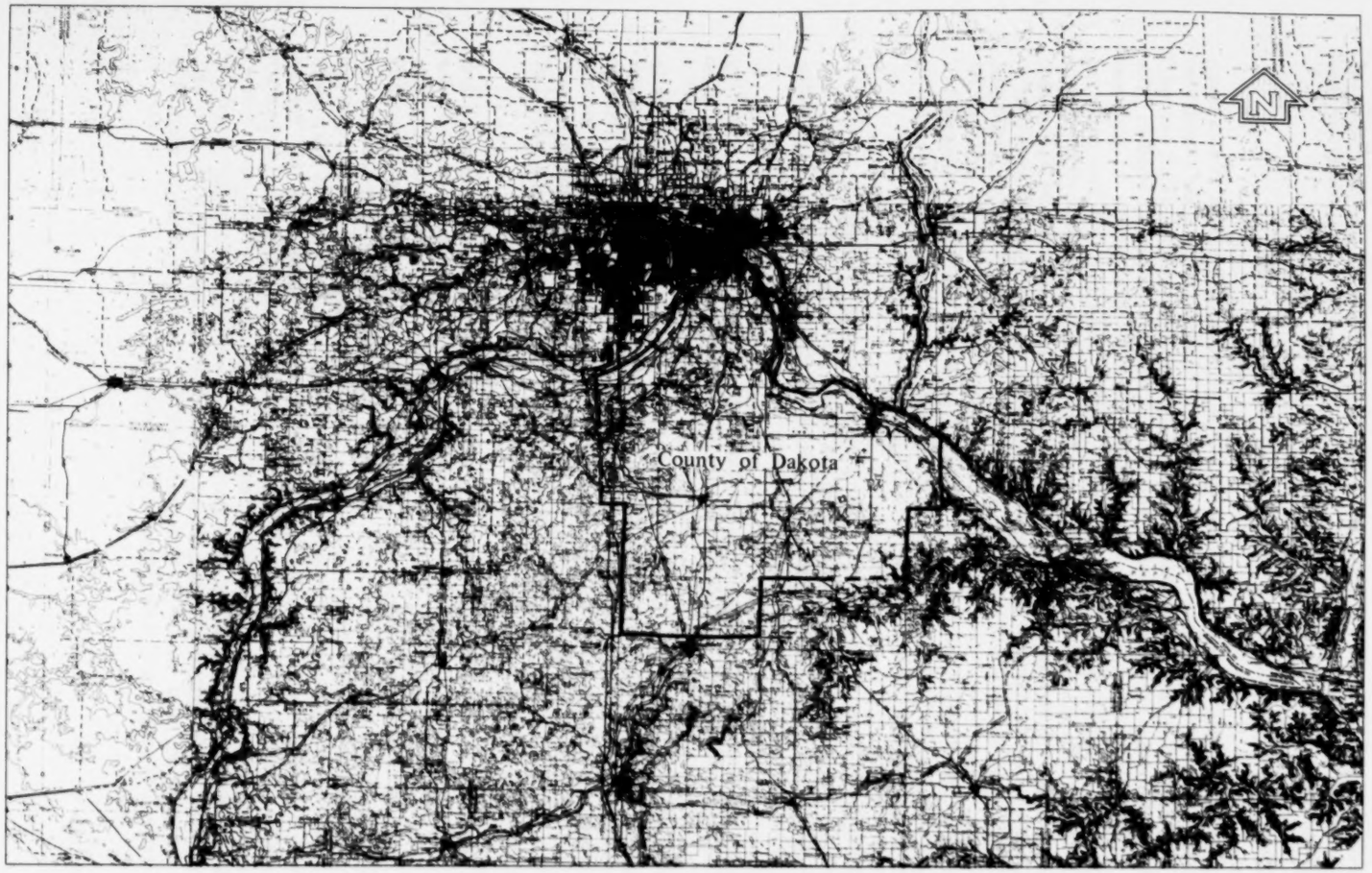

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

APPROXIMATE SCALE
12 0 12 24 36 MILES

VICINITY MAP

corporate limit upstream to the eastern corporate limit of the City of Rosemount; tributaries to the Cannon River; and tributaries to the Vermillion River.

2.2 Community Description

Dakota County is located in east-cental Minnesota, and is one of the seven counties which comprise the Twin Cities metropolitan area. The population growth of Dakota County has exhibited a tremendous increase (78.5 percent) from 1960 to 1970, as shown in the 1970 U.S. Census Bureau report. The Dakota County population was 139,808 in 1970 (Reference 5) and was estimaed at 192,390 in 1978 (Reference 6). However, this has occurred primarily in the suburbs, as the rural population has declined 15.6 percent during the same time period. Dakota County covers an area of 576 square miles. Dakota County is surrounded by Goodhue, Hennepin, Ramsey, Rice, Scott, and Washington Counties, Minnesota, and Pierce County, Wisconsin. Dakota County was established by the Minnesota Legislature on October 27, 1899. The county was named for the Dakota people, which are comprised of a large number of allied and affiliated Indian tribes. Hastings is the seat for Dakota County (Reference 7).

Several factors influence the frequency and nature of flooding in Dakota County. These factors are climate, soils, topography, vegetation, and existing land use in the drainage basins of the Cannon River, the Vermillion River, and the Mississippi River.

Dakota County is situated in a "continental" type climate characterized by severe winters and relatively short, warm summers. The warmest month is July with an average daily temperature of 72.8 degrees Fahrenheit (F.) (23 degrees C.). The coldest month is January with an average daily temperature of 13.9 degrees F. (-13 degrees C.). The average annual temperature is approximately 44.9 degrees F. (7 degrees C.). The average annual growing season is 155 days. The annual precipitation is 28.5 inches, which occurs principally in the form of rain showers during the warm season. The average annual rainfall is 25 inches with an average annual snowfall of approximately 45 inches (Reference 8).

The native vegetation of Dakota County consisted of prairie grasses and trees. The smooth and undulating plains in the southwestern part of the county were natural prairies, and, prior to cultivation, were covered with a dense growth of big bluestem and associated grasses. Small, strongly rolling areas within the prairies were generally timbered. The hilly belt in the northern and western parts of the county was covered with hardwood forests. In the virgin forests, the primary species were white oak, black oak, red oak, maple, basswood, elm, and boxelder. Most areas that can be cultivated have been cleared of the original timber and are used for pasture and general farm crops. Sizable areas of rough land are in cutover timber and brush. Much of this acreage is best suited to forest. Some of the bottom lands, which are subject to overflow, were covered with elm, ash, cottonwood, and willow. The peat bogs that are not drained support a growth of sedges and marsh grasses (Reference 9).

Dakota County lies in the western drift section of the Central Lowland province. Most of the county is less than 1,050 feet above sea level. It is one of the lowest counties bordering the Mississippi River in southeastern Minnesota. The northern part of the county is occupied by the Cary glacial terminal moraine and is characterized by a typical knob-and-kettle or knoll-and-basin topography. The areas suitable for cultivation in this part of the county are scattered among woodland areas. Many of the basins are swampy or ponded. Most of them will never be drained artificially because there are no suitable outlets. South of the Cary moraine, the rock surface is quite irregular because the soft strata have been worn down so that they are much lower than the more resistant beds. This has resulted in the formation of isolated mesalike uplands, or buttes, that stand 100 feet to 200 feet above the surrounding land. These buttes are especially prominent in the southern part of the county near Randolph. There the glacial deposits have only partially concealed the old escarpments of the mesas and have coated their tablelike surfaces with only a thin mantle of glacial drift.

South of the morainic hilly areas and in between the buttes are smooth outwash plains that formed from material deposited by water from melting glaciers to the north and west. Normally, the outwash material is sandy and gravelly in the subsoil. In places, it is silty at the surface. The outwash plains generally extend across the county in an east-west direction. The areas around Rosemount, Farmington, and Lakeville are outwash plains. In many parts of the southern half of the county are undulating plains that are somewhat smoother than the hilly belt in the northern part. These areas normally have dark-colored prairie soils that developed from glacial till. Many of the areas are normally somewhat poorly drained; tile has been installed in many places to remove the excess water.

All the natural drainageways in the county find outlets into the Mississippi River. The Vermillion River crosses the county in a northeasterly course. It flows from the southwestern part through the Town of Farmington and into the Mississippi River below Hastings. The Cannon River and its northern fork, Chub Creek, drain the southern tier of townships.

Development within the flood plains in the county is scattered and is primarily residential.

2.3 Principal Flood Problems

The county is susceptible to flooding due to rapid snowmelt and/or spring rains, as well as summer and autumn rainfall. The April 1965 flood is the largest known flood for both the Cannon River and the Vermillion River. The highest recent flood, recorded on the Mississippi River in 1965, had a recurrence interval of 120 years at the Red Wing gage, which is located downstream from Hastings (Reference 10). The planned Lakeville-Farmington wastewater treatment plant will be located in a rural setting in the Township of Empire adjacent to the Vermillion River. However, this plant will be located on fill above the flood plain.

Past flood problems include siltation, debris accumulation, ice jams, inundated structures, streambank erosion, "wet" basements, the disruption of public and private business services, and the interruption of industrial activities.

2.4 Flood Protection Measures

There are no known existing or proposed significant flood protection measures for the unincorporated areas of Dakota County.

3.0 ENGINEERING METHODS

For flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Floods having recurrence intervals of 10, 50, 100, and 500 years have been selected as having special significance for flood plain management and for flood insurance premium rates. The analyses reported here reflect current conditions in the watersheds of the streams.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail in the community.

No stream gage data are available in or near the study area for the Vermillion River. The discharges for the selected frequency floods were determined through the use of a standard SCS TR-20 computer program (Reference 11). This program uses rainfall-runoff relationships and other physical characteristics to predict the discharge from a rainfall event of a given frequency.

The discharge-frequency relationship at the mouth of Unnamed Creek was calculated based on the regression equations developed by the USGS (Reference 12). The basin characteristics used in the equations were 8.91 square miles of drainage area, 50 feet per mile of channel slope, and zero percentage of lake and swamp.

A gaging station (no. 5-3552) on the Cannon River at Welch, Minnesota, provided 47 years of record and was the principal source of data for defining discharge-frequency relationships for the Cannon River. Log-Pearson Type III frequency distribution and analyses were performed based on a zero regional skew coefficient yielding discharge values for the 10-, 50-, 100-, and 500-year floods at Welch (Reference 13). A frequency-discharge drainage area curve for the Cannon River main stream was provided by the USGS, taking into account the increasing percent of lake storage in the upper portion of the watershed. This curve was used for the coordinated 100-year flow estimates. The 10-, 50-, and 500-year flood discharges at Northfield and Dundas were determined using the discharge-drainage area

relationship. A power, n=0.98, was obtained from the 100-year discharge between Welch and Northfield. Discharges for the Cannon River downstream of Byllesby Dam were coordinated with the Cannon Falls Flood Insurance Study (Reference 14). The Lake Byllesby inflow and outflow were assumed to be equal.

Peak discharges for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the streams in the community were carried out to provide estimates of the elevations of the floods of the selected recurrence intervals along each flooding source studied in detail.

Cross section data for the Vermillion River from approximately 34 miles west of Hastings to the county boundary were obtained to estimate the significant backwater effect of the bridges and to reflect variations in stream valley topography. Data were obtained from field surveys by the St. Paul District COE (Reference 1). Cross sections for the reach of the Vermillion River from mile 4.35 to mile 33.92 were obtained from field surveys in July 1973. There have been no significant changes in the channel and watershed characteristics since the 1973 survey. Cross sections for Unnamed Creek were obtained to reflect the significant variations in stream valley topography in March 1978. Data from the cross sections and bridge profiles for the Cannon River were obtained from field surveys conducted by the Study Contractor in the summer of 1976.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway is computed (Section 4.2), selected cross section locations are shown on the Flood Boundary and Floodway Map (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals for the Vermillion River, from approximately 34 miles west of Hastings to the corporate limits of Dakota County, were calculated utilizing HEC-2, the standard backwater computer program developed by the COE (Reference 15). Loss coefficients for bridges and other channel obstructions and channel and overbank roughness coefficients (Manning's "n") were estimated by field inspection. Manning's "n" for the channel was a constant of 0.038 while the overbank varied from 0.06 to 0.10. Starting water-surface elevations were provided by the COE (Reference 1).

The flood hazard analyses studied by the SCS includes the reach of the Vermillion River from mile 4.35 to mile 33.92, a distance of 29.57 stream miles (Reference 16). All mileages were measured from the Mill Dam in Hastings. WSP-2, the backwater computer program developed by the SCS, was utilized to calculate water-surface elevations of floods of the selected recurrence intervals (Reference 17).

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA SQ MILES	PEAK DISCHARGES (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
VERMILLION RIVER (Cross Section Numbers)					
0.3 mile upstream from Cedar Avenue	20.97	490	807	970	1,430
0.7 mile downstream from Cedar Avenue	23.14	575	930	1,100	1,580
1.0 mile upstream from 225th Street	28.32	820	1,340	1,620	2,330
220th Street	38.28	1,400	2,370	2,880	4,170
0.3 mile downstream from State Highway 3	53.93	2,220	3,900	4,730	7,000
Upstream from confluence of South Branch Vermillion River	122.85	3,050	5,550	6,980	10,900
0.5 mile upstream from 160th Street	175.05	3,050	5,550	6,980	10,900
Downstream from Jorgen Avenue		3,280	6,000	7,500	11,800
Upstream of Peavy Mill Dam in Hastings	217	3,570	6,530	8,100	12,800
UNNAMED CREEK NEAR ETTER					
At mouth	8.91	1,444	2,582	3,145	4,500
CANNON RIVER					
Welch gaging station	1,320	15,300	27,200	34,000*	53,000
Northfield	925	10,700	19,000	24,000*	37,000
Dundas	845	9,800	17,500	22,000*	34,000
Byllesby Dam Outflow	1,116	13,000	23,000	29,000*	45,000

*Coordination between the USGS and the COE on December 23, 1976.

A metropolitan waste water treatment plant is now under construction near the City of Farmington. Since this construction would cause only a small change in the water-surface elevations upstream of the plant, the previous study by the SCS would still be valid (Reference 16). Manning's "n" for the channel varied from 0.035 to 0.06 while the overbank varied from 0.065 to 0.15. Starting water-surface elevations for the lower study limit were coordinated with the COE in their Flood Plain Information report for the City of Hastings (Reference 1).

That portion of the Vermillion River from the upper limit of the SCS study to the corporated limits of Dakota County was studied by Howard, Needles, Tammen & Bergendoff. Cross sections and bridge profiles were obtained from field surveys in the summer of 1976. The HEC-2 computer program was used to compute the water-surface elevations of floods of the selected recurrence intervals (Reference 15). Manning's "n" for the channel varied from 0.04 to 0.045 while the overbank varied from 0.05 to 0.08.

Howard, Needles, Tammen & Bergendoff utilized existing COE hydrologic data (operational curve and historic water-surface elevations for the Mississippi River) to develop recurrence interval water-surface profiles and flood boundaries for the section of the Vermillion River extending east and southeast from the Hastings corporate limit to the Dakota County boundary (References 1, 2, and 3). Water-surface elevations for the Vermillion River in this area were estimated to be the same as the water-surface elevation of the Mississippi River since the two rivers flow parallel to each other and the Mississippi River controls the Vermillion River. Water-surface elevations of floods of the selected recurrence intervals for the Mississippi River were computed based on a rating curve at Lock and Dam No. 2 near Hastings (Reference 1) and an operational curve at Lock and Dam No. 3 near Red Wing (Reference 2). The computed water-surface elevations match those of the Mississippi River, Regional Flood Analysis (Reference 3). Water-surface elevations of floods of the selected recurrence intervals for Unnamed Creek near Etter were calculated using the standard step-backwater computer program developed by the COE (Reference 15). Channel and overbank roughness coefficients (Manning's "n") were estimated by field inspection. The Manning's "n" value for the creek was a constant 0.05, while the overbank value varied from 0.065 to 0.08. Starting water-surface elevations for the creek were determined using a drainage area ratio procedure (Reference 17). The computed flood elevation for Unnamed Creek is higher than the elevation of the small embankments which exist on both sides of the creek. These embankments prevent floodwaters from reentering the normal channel of Unnamed Creek.

For that portion of the Cannon River from the Byllesby Dam outlet to the corporate limits of Cannon Falls, the starting water-surface elevations were obtained from the Cannon Falls Flood Insurance Study (Reference 14). The HEC-2 program was also used to compute the water-surface elevations for the selected recurrence intervals (Reference 15). The computed water-surface elevations at the Byllesby Dam outlet agreed with those for the tailwater curve at the outlet. The tailwater curve was developed at the outlet of Byllesby Dam using recorded data from 1945 to 1967 by Northern

States Power Company (Reference 18). Manning's "n" for the channel was a constant of 0.04 while the overbank varied from 0.05 to 0.06.

For that portion of the Cannon River from the Byllesby Dam to the upper corporate limit of Dakota County, the HEC-2 backwater computer program was also used. Loss coefficients for bridges and other channel obstructions, and channel and overbank roughness coefficients (Manning's "n"), were initially estimated by field inspection. Adjustments were made in the coefficients until the computed water-surface profile matched the unpublished 1965 historic water-surface profile of the Cannon River (Reference 17). Manning's "n" for the Cannon River channel was a constant value of 0.03 while the overbank varied from 0.05 to 0.11. These coefficients were then used to determine the 10-, 50-, 100-, and 500-year frequency flood profiles. Starting water-surface elevations were obtained from the headwater curve for the Byllesby Dam spillway which was developed utilizing recorded data from 1945 to 1967 by Northern States Power Company (Reference 18).

Flood levels for the approximate study of the Mississippi River are based on the Minnesota Department of Natural Resources Flood Plain Information and Management report (Reference 20), the Mississippi River Regional Flood Analysis report (Reference 3), and the USGS flood prone area maps (Reference 21). The approximate study of Mini Creek was determined using the 100-year flood elevation on the Cannon River at the mouth of the creek and the bed slope of the creek. The approximate study of Chub Creek is based on USGS flood prone area maps (Reference 21) and field inspection of the study area. The approximate studies of the unnamed creeks on the Vermillion River were determined using the 100-year flood elevation on the Vermillion River at the mouth of these creeks and utilizing the bed slope of the creeks. These elevations were then checked with the USGS flood prone area maps (Reference 21) and by field inspection.

Flood elevations on the Cannon River, the Vermillion River, Unnamed Creek in Etter, and the Mississippi River and its creeks can be raised by derbis accumulations and ice jams at hydraulic structures; however, the hydraulic analysis of this study is based only on the effects of unobstructed flow. The flood elevations as shown on the profiles are thus considered valid only if hydraulic structures remain generally unobstructed, operate properly, and do not fail. Likewise, changes in the existing bridge, levee or elevations could affect the existing flood elevations.

All elevations are referenced from National Geodetic Vertical Datum of 1929 (NGVD); elevation reference marks used in the study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the Federal Insurance Administration as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each flooding source studied in detail, the boundaries of the 100-year and the 500-year floods have been delineated using the elevations determined at each cross section; between cross sections the boundaries were interpolated using quadrangle maps with 10-foot countour intervals (Reference 22), and SCS two-foot contour maps where available for the Vermillion River (Reference 16).

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 2). Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to lack of detailed topographical information or to limitations of the map scale, such areas are not shown. In cases where the 100-year and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity and increases flood heights, thus increasing flood hazard in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment in order that the 100-year flood be carried without substantial increases in flood heights. As minimum standards, the Federal Insurance Administration limits such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. In Minnesota, however, flood plain encroachment is limited by Minnesota Regulations to that which would cause a 0.5-foot increase in flood heights above prefloodway conditions at any points (Reference 23). Floodways having no more than a 0.5-foot surcharge were delineated for this study.

Specific floodway limits at each cross section were requested and agreed upon by county officials and the Minnesota Department of Natural Resources. Consequently, the resulting stage increases for the requested channel encroachment limits were noted. These stage increases meet Minnesota encroachment requirements (Reference 21). The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed (Table 2).

Since the 100-year flood plain of Unnamed Creek was designated as shallow flooding with approximately two feet of depth, no floodway was developed. No floodway was delineated for that portion of the Vermillion River from the Hastings corporate limit southeast to the county boundary because it was studied using historical data.

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 0.5 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

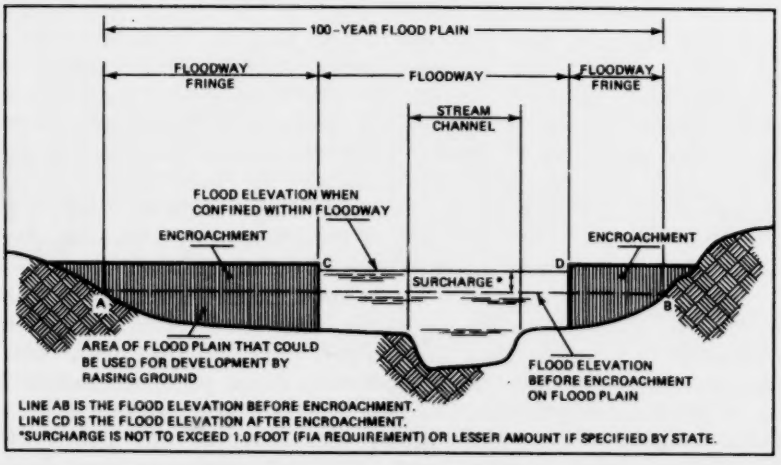
100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE *
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT.
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT.
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FIA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FIGURE 2 - Floodway Schematic

The floodways in this report are recommended to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
VERMILLION RIVER								
A	13.77	663	2876	2.61	803.2	803.2	803.2	0.0
B	14.20	430	1639	4.58	804.8	804.8	804.8	0.0
C	14.43	650	787	9.53	806.4	806.4	806.4	0.0
D	14.87	460	2759	2.53	809.2	809.2	809.2	0.0
E	15.18	500	2078	3.36	810.6	810.6	810.6	0.0
F	15.65	590	2528	2.76	812.8	812.8	812.8	0.0
G	15.76	747	1928	3.62	814.0	814.0	814.0	0.0
H	15.84	747	1920	3.64	814.0	814.0	814.0	0.0
I	15.92	726	3049	2.29	814.9	814.9	814.9	0.0
J	16.17	810	3219	2.17	815.7	815.7	815.7	0.0
K	16.90	815	3384	2.06	819.2	819.2	819.2	0.0
L	17.27	640	3582	1.95	821.0	821.0	821.2	0.2
M	17.43	1100	5227	1.34	821.4	821.4	821.6	0.2
N	18.06	1260	4354	1.60	824.7	824.7	824.9	0.2
O	18.32	1500	6686	1.04	825.4	825.4	825.5	0.1
P	18.63	2100	609	11.46	828.4	828.4	828.5	0.1
Q	19.07	1800	7470	0.93	828.8	828.8	828.9	0.1
R	19.39	1080[2]	3699	1.89	830.0	830.0	830.0	0.0
S	20.64	1230	7201	0.97	837.3	837.3	837.3	0.0
T	20.97	1240	6131	1.14	837.8	837.8	837.9	0.1
U	21.85	2100	5166	1.35	841.0	841.0	841.0	0.0
V	22.92	1070	4172	1.67	844.9	844.9	844.9	0.0
W	23.08	820	975	7.16	847.9	847.9	847.9	0.0
X	23.21	1700	8778	0.73	848.2	848.2	848.2	0.0
Y	23.48	1070	1884	3.42	848.5	848.5	848.5	0.0
Z	23.83	1120	4889	1.32	849.6	849.6	849.6	0.0

[1]MILES ABOVE COUNTY BOUNDARY
[2]THIS WIDTH EXTENDS WITHIN AREA NOT INCLUDED

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration
COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

FLOODWAY DATA

VERMILLION RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
VERMILLION RIVER								
AA	24.30	1260	5193	1.24	850.3	850.3	850.3	0.0
AB	24.63	1200	4120	1.57	851.4	851.4	851.4	0.0
AC	24.91	1520	5478	1.18	855.0	855.0	855.0	0.0
AD	25.14	1100	5012	1.29	855.6	855.6	855.6	0.0
AE	26.02	880	3864	1.67	859.7	859.7	859.7	0.0
AF	26.60	2075	4768	1.35	862.9	862.9	862.9	0.0
AG	27.20	1360	6152	1.05	863.6	863.6	863.6	0.0
AH	27.72	1590	4771	1.35	865.1	865.1	865.1	0.0
AI	28.39	1320	3091	2.09	866.9	866.9	866.9	0.0
AJ	29.26	890	3812	1.69	873.2	873.2	873.2	0.0
AK	29.90	1130	4075	1.58	876.3	876.3	876.5	0.2
AL	30.40	1550	4960	1.30	878.8	878.8	878.8	0.0
AM	30.78	1500	4134	1.56	881.4	881.4	881.4	0.0
AN	31.44	1515	4020	1.60	884.4	884.4	884.4	0.0
AO	32.13	900	3484	1.85	888.5	888.5	888.5	0.0
AP	32.63	520	2056	3.14	890.6	890.6	890.6	0.0
AQ	33.08	680	3590	1.80	895.7	895.7	895.7	0.0
AR	33.25	1120	4598	1.40	895.8	895.8	895.8	0.0
AS	33.42	1140	4242	1.52	896.1	896.1	896.1	0.0
AT	36.04	620	2938	0.98	912.6	912.6	912.6	0.0
AU	36.68	1070	2212	1.30	916.9	916.9	916.9	0.0
AV	36.77	640	2260	1.27	918.1	918.1	918.1	0.0
AW	37.10	1030	2355	1.22	919.3	919.3	919.3	0.0
AX	37.85	300	808	2.00	924.3	924.3	924.3	0.0
AY	38.18	460	896	1.81	926.7	926.7	926.7	0.0
AZ	38.67	300	821	1.97	931.3	931.3	931.4	0.1

[1]MILES ABOVE COUNTY BOUNDARY

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration
COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

FLOODWAY DATA

VERMILLION RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
VERMILLION RIVER								
BA	39.14	380	1146	1.41	936.6	936.6	936.7	0.1
BB	39.55	320	1187	0.93	938.5	938.5	938.5	0.0
BC	40.22	360	878	1.25	949.5	949.5	949.5	0.0
BD	40.54	400	794	1.22	950.6	950.6	950.6	0.0
BE	41.07	310	778	1.25	958.0	958.0	958.0	0.0
BF	41.49	350	667	1.45	961.9	961.9	961.9	0.0
BG	41.99	320	1237	0.78	972.0	972.0	972.0	0.0
BH	42.21	430	943	1.03	972.6	972.6	972.6	0.0
BI	42.64	550	824	1.18	980.8	980.8	980.8	0.0
BJ	43.04	230	580	1.67	987.0	987.0	987.0	0.0
BK	43.38	120	449	2.16	993.1	993.1	993.1	0.0
BL	43.67	240	500	1.94	999.3	999.3	999.3	0.0
BM	43.83	260	1196	0.81	999.5	999.5	999.5	0.0
BN	44.09	180	694	1.40	999.6	999.6	999.6	0.0
BO	44.40	500	883	1.10	1000.2	1000.2	1000.2	0.0
BP	44.66	440	1837	0.53	1000.3	1000.3	1000.3	0.0
BQ	44.88	480	929	1.04	1000.3	1000.3	1000.3	0.0
BR	45.18	620	935	1.04	1000.8	1000.8	1000.8	0.0
BS	45.37	200	138	7.03	1003.7	1003.7	1003.7	0.0
BT	45.51	120	333	2.91	1008.7	1008.7	1008.7	0.0

[1]MILES ABOVE COUNTY BOUNDARY

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration
COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

FLOODWAY DATA

VERMILLION RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
CANNON RIVER								
A	0.26	218[2]	2565	11.31	802.2	802.2	802.3	0.1
B	0.29	224[2]	2825	10.26	803.4	803.4	803.4	0.0
C	0.44	1788[2]	8536	3.40	805.9	805.9	805.9	0.0
D	0.67	1276[2]	4874	5.95	806.9	806.9	806.9	0.0
E	0.92	230[2]	2608	11.12	809.4	809.4	809.4	0.0
F	1.19	178[2]	2779	10.44	813.5	813.5	813.5	0.0
G	5.54	1438[2]	5117	4.69	861.1	861.1	861.1	0.0
H	5.73	1080[2]	7442	3.22	864.6	864.6	864.6	0.0
I	5.90	580[2]	2030	11.82	864.6	864.6	864.6	0.0
J	6.12	1400[2]	4190	5.73	869.6	869.6	869.6	0.0
K	6.37	2050[2]	13,675	1.76	870.6	870.6	870.6	0.0
L	6.50	1480[2]	7827	3.07	870.6	870.6	870.6	0.0
M	6.78	958[2]	6850	3.50	871.3	871.3	871.3	0.0
N	7.03	658[2]	4370	5.49	872.7	872.7	872.7	0.0
O	7.34	1144	6848	3.50	875.6	875.6	875.6	0.0
P	7.67	1069	4828	4.97	877.2	877.2	877.2	0.0
Q	7.91	752	4066	5.90	878.3	878.3	878.3	0.0
R	8.22	631	4532	5.30	880.4	880.4	880.4	0.0
S	8.40	395	3406	7.05	881.2	881.2	881.2	0.0
T	8.78	741	4082	5.88	882.7	882.7	882.7	0.0
U	8.96	515	4419	5.43	884.1	884.1	884.1	0.0
V	9.24	736	4721	5.08	885.0	885.0	885.0	0.0
W	9.32	1024	5744	4.18	885.7	885.7	885.7	0.0
X	9.50	194	2640	9.09	886.9	886.9	886.9	0.0
Y	9.73	879	6817	3.52	888.4	888.4	888.4	0.0
Z	10.00	868	6519	3.68	888.9	888.9	888.9	0.0

[1]MILES ABOVE COUNTY BOUNDARY
[2]THIS WIDTH EXTENDS BEYOND COUNTY BOUNDARY

TABLE

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration
COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

FLOODWAY DATA

CANNON RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
CANNON RIVER								
AA	10.25	1132	8551	2.81	889.4	889.4	889.4	0.0
AB	10.53	727	5090	4.72	889.7	889.7	889.7	0.0
AC	10.75	1344	6602	3.64	890.4	890.4	890.4	0.0
AD	11.02	1001	5336	4.50	891.0	891.0	891.0	0.0
AE	11.28	1397	6669	3.60	891.7	891.7	891.7	0.0
AF	11.57	1408	7112	3.37	892.5	892.5	892.5	0.0
AG	11.86	1150	11,548	2.08	893.3	893.3	893.3	0.0
AH	12.40	1389	9459	2.54	893.8	893.8	893.8	0.0
AI	12.44	820	2959	8.11	893.8	893.8	893.8	0.0
AJ	12.68	1000	3364	7.13	895.8	895.8	895.8	0.0
AK	13.02	780	8373	2.87	897.6	897.6	897.6	0.0
AL	13.27	1189	10,771	2.23	898.1	898.1	898.1	0.0
AM	13.47	1340	13,848	1.73	898.6	898.6	898.6	0.0
AN	13.67	1152[2]	7065	3.40	898.6	898.6	898.6	0.0
AO	13.87	454[2]	4811	4.99	899.0	899.0	899.1	0.1

[1]MILES ABOVE COUNTY BOUNDARY
[2]THIS WIDTH EXTENDS WITHIN CITY OF NORTHFIELD

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration
COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

FLOODWAY DATA

CANNON RIVER

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the Federal Insurance Administration has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source affecting the unincorporated areas of Dakota County.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods.This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the unincorporated areas of Dakota County are shown on the Flood Profiles (Exhibit 1) and are summarized in the Flood Insurance Zone Data Table (Table 3).

5.2 Flood Hazard Factors

The Flood Hazard Factor is the Federal Insurance Administration device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their Flood Hazard Factors are used to set actuarial insurance premium rate tables based on Flood Hazard Factors from 005 to 200.

The Flood Hazard Factor for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest 0.5 foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the Flood Hazard Factor is 005; if the difference is 1.4 feet, the Flood Hazard Factor is 015; if the difference is 5.0 feet, the Flood Hazard Factor is 050. When the difference between the 10-and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the Flood Hazard Factor is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective Flood Hazard Factors, the unincorporated areas of Dakota County were divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations are shown or Flood Hazard Factors determined.
Zone A0:	Special Flood Hazard Areas inundated by types of 100-year shallow flooding where depths are between 1.0 and 3.0 feet; depths are shown; but no Flood Hazard Factors are determined.
Zones A2-A6, A8, A10, A11:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations are shown, and zones subdivided according to Flood Hazard Factor.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; or areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, Flood Hazard Factors, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the unincorporated areas of Dakota County is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
VERMILLION RIVER							
REACH 1	0125,0200	–5.2	–1.0	3.7	050	A10	VARIES–SEE MAP
REACH 2	0175	–2.9	–0.9	2.2	030	A6	VARIES–SEE MAP
REACH 3	0175	–1.9	–0.5	1.2	020	A4	VARIES–SEE MAP
REACH 4	0175	–1.9	–0.6	1.0	020	A4	VARIES–SEE MAP
REACH 5	0175	–2.4	–0.3	3.3	025	A5	VARIES–SEE MAP
REACH 6	0150,0175	–1.5	–0.4	1.2	015	A3	VARIES–SEE MAP
REACH 7	0150	–2.7	–1.2	1.3	025	A5	VARIES–SEE MAP
REACH 8	0150	–1.1	–0.3	0.7	010	A2	VARIES–SEE MAP
REACH 9	0150	–1.7	–0.5	1.3	015	A3	VARIES–SEE MAP
CANNON RIVER							
REACH 1	0250	–4.9	–1.6	5.5	050	A10	VARIES–SEE MAP
REACH 2	0250	–2.6	–0.9	2.6	025	A5	VARIES–SEE MAP
REACH 3	0250	–4.2	–1.6	4.4	040	A8	VARIES–SEE MAP
REACH 4	0225,0250	–5.7	–2.0	3.7	055	A11	VARIES–SEE MAP
MISSISSIPPI RIVER							
REACH 1	0125,0200	–5.4	–1.5	3.0	050	A10	VARIES–SEE MAP
REACH 2	0100	–6.3	–1.8	4.7	065	A12	VARIES–SEE MAP

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

FLOOD INSURANCE ZONE DATA

VERMILLION RIVER - CANNON RIVER - MISSISSIPPI RIVER

flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the Federal Insurance Administration.

6.0 OTHER STUDIES

The COE has compiled historical high water profiles for the Mississippi River, the Cannon River, and the Vermillion River (References 2, 19, and 24). Several reports were utilized throughout this study and agree completely with the results of this Flood Insurance Study. They include the COE Flood Plain Information study on the Mississippi and Vermillion Rivers (Reference 1); the SCS Flood Hazard Analyses on the Vermillion River (Reference 16); the Mississippi River Regional Flood Analysis by the Minnesota Department of Natural Resources (Reference 3); the COE Detailed Project Report for Flood Control (Reference 25); Flood Insurance Studies for the City of Farmington (Reference 26), the City of Hastings (Reference 27), the City of Vermillion (Reference 28), the City of Northfield (Reference 29), Scott County (Reference 30), the City of Cannon Falls (Reference 14), the City of Cottage Grove (Reference 31), and Goodhue County (Reference 10).

A Flood Hazard Boundary Map has been published by the Federal Insurance Administration (Reference 32). The differences between the Flood Hazard Boundary Map and this study are justified due to the more detailed nature of this Flood Insurance Study.

This report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the National Flood Insurance Program.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic and other pertinent data used in this study can be obtained by contacting the Insurance and Mitigation Division, Federal Emergency Management Agency, One North Dearborn Street, Chicago, Illinois 60602.

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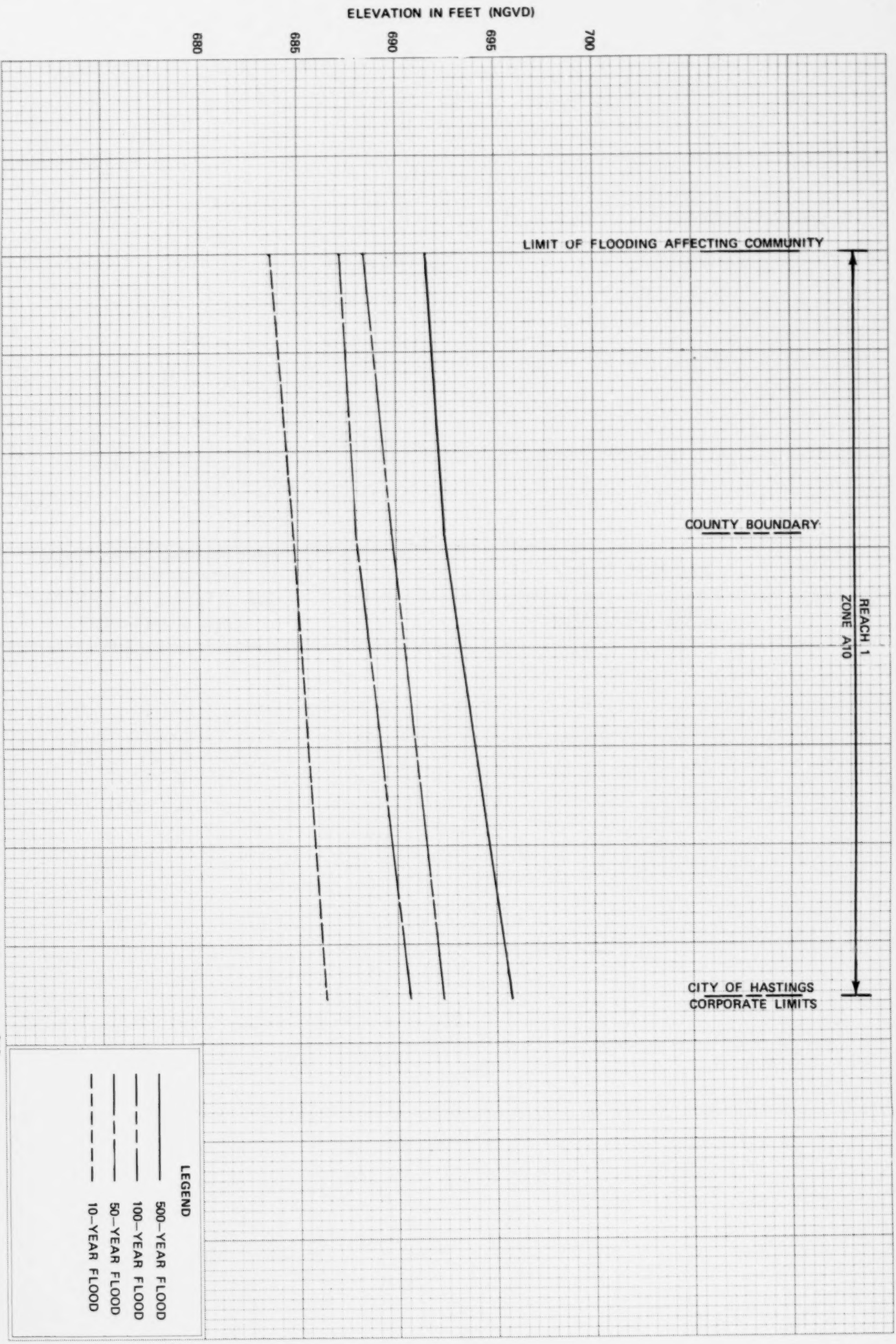


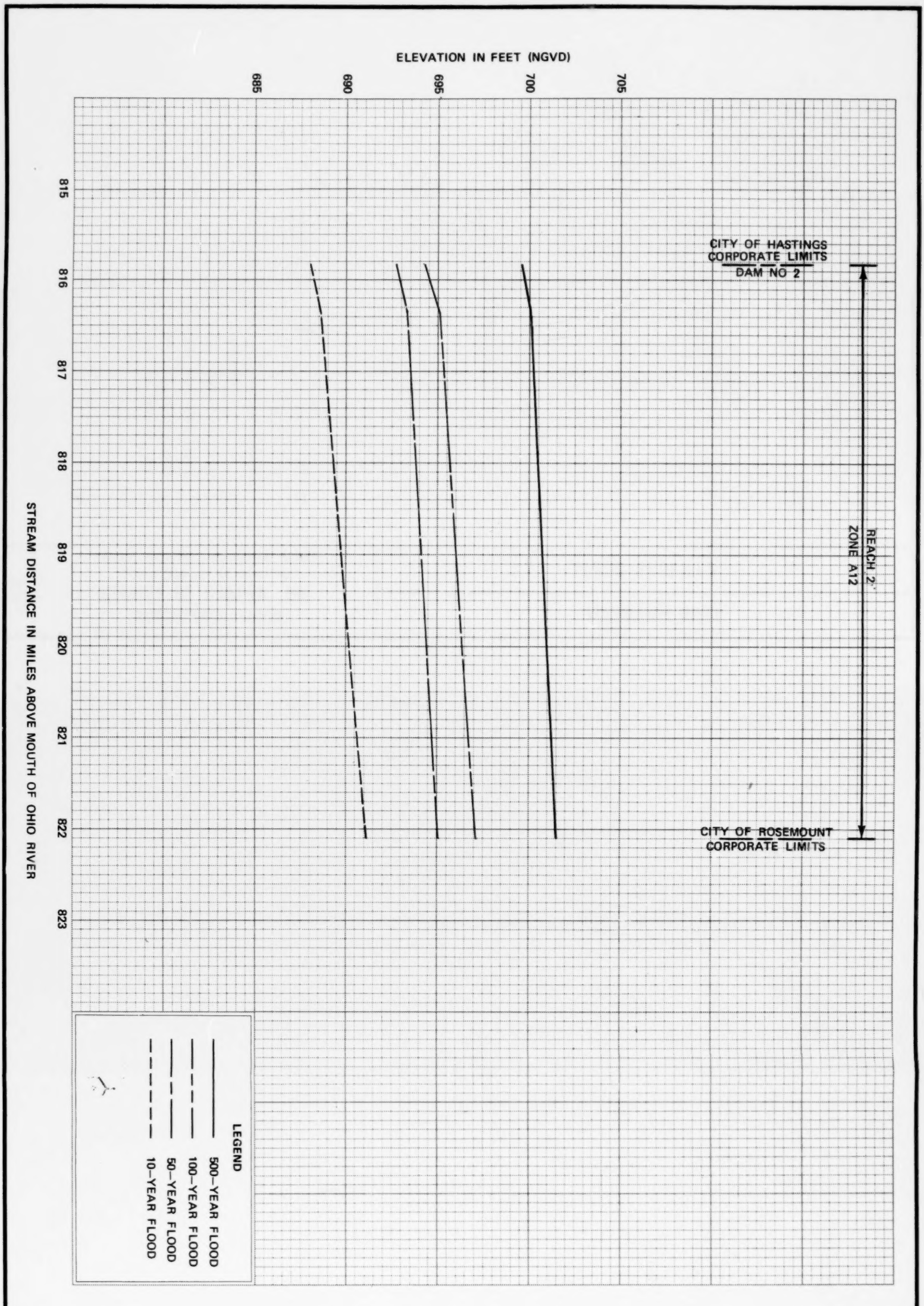
01P

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

FLOOD PROFILES

MISSISSIPPI RIVER



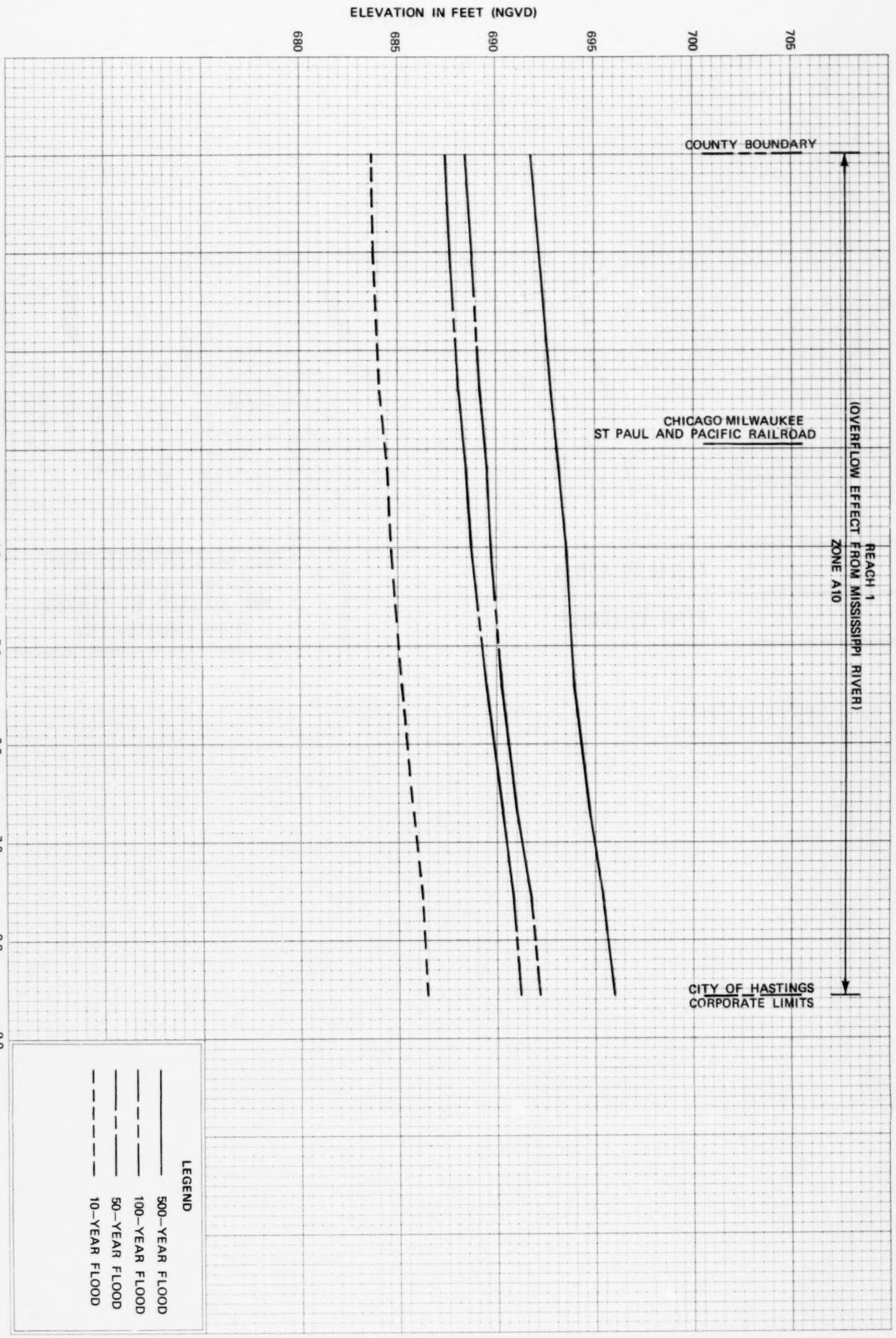
02P

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

FLOOD PROFILES

MISSISSIPPI RIVER



03P

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration
COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

FLOOD PROFILES

VERMILLION RIVER

REACH 2
ZONE A6

REACH 3
ZONE A4

CITY OF HASTINGS
CORPORATE LIMITS

160TH STREET

170TH STREET

ELEVATION IN FEET (NGVD)

820
815
810
805
800
795
790

13.50 13.75 14.00 14.25 14.50 14.75 15.00 15.25 15.50 15.75 16.00

STREAM DISTANCE IN MILES ABOVE COUNTY BOUNDARY

A B C D E F G H I

LEGEND

- 500–YEAR FLOOD
- 100–YEAR FLOOD
- 50–YEAR FLOOD
- 10–YEAR FLOOD
- STREAM BED
- A — CROSS SECTION LOCATION

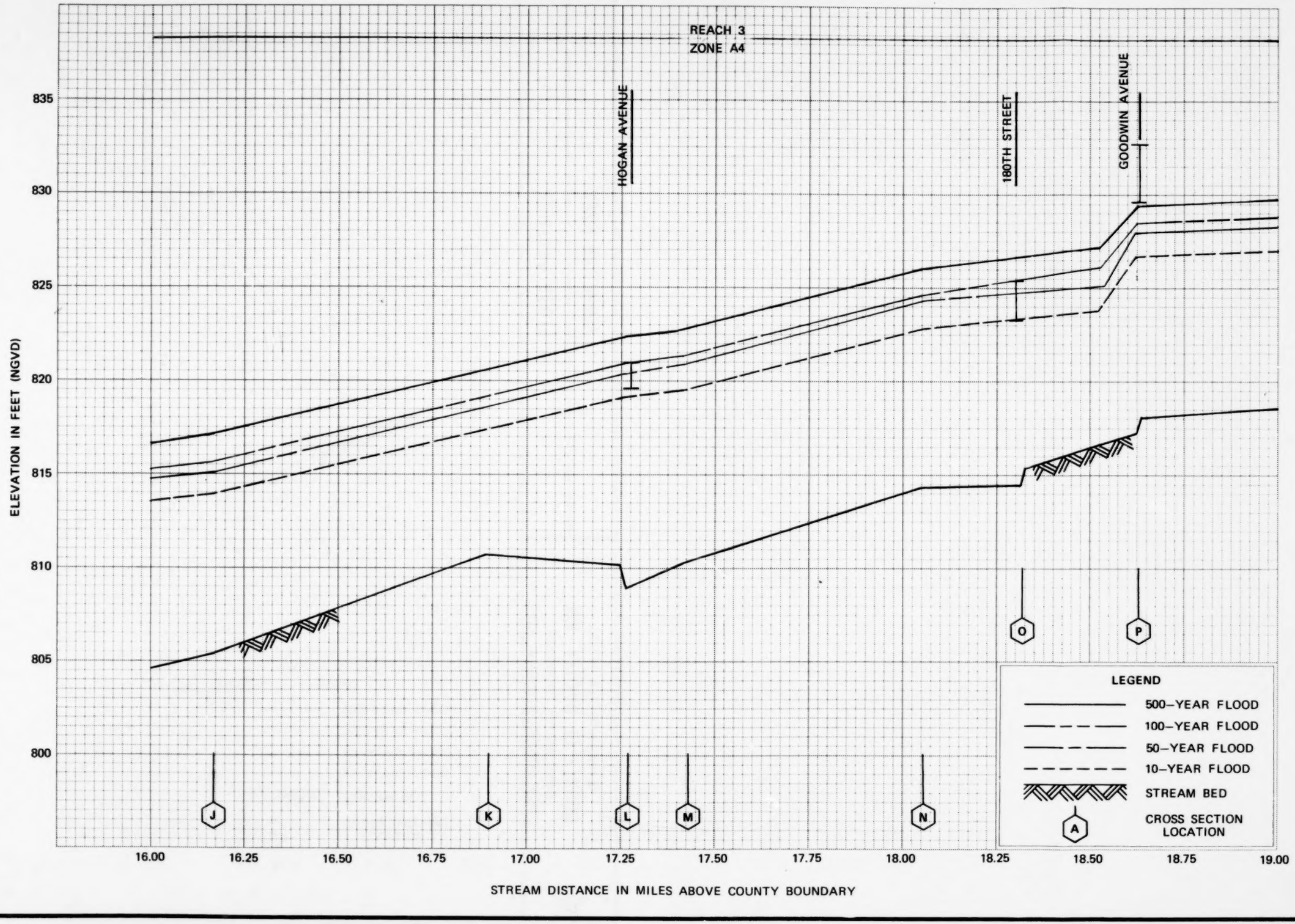
FLOOD PROFILES

VERMILLION RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

04P

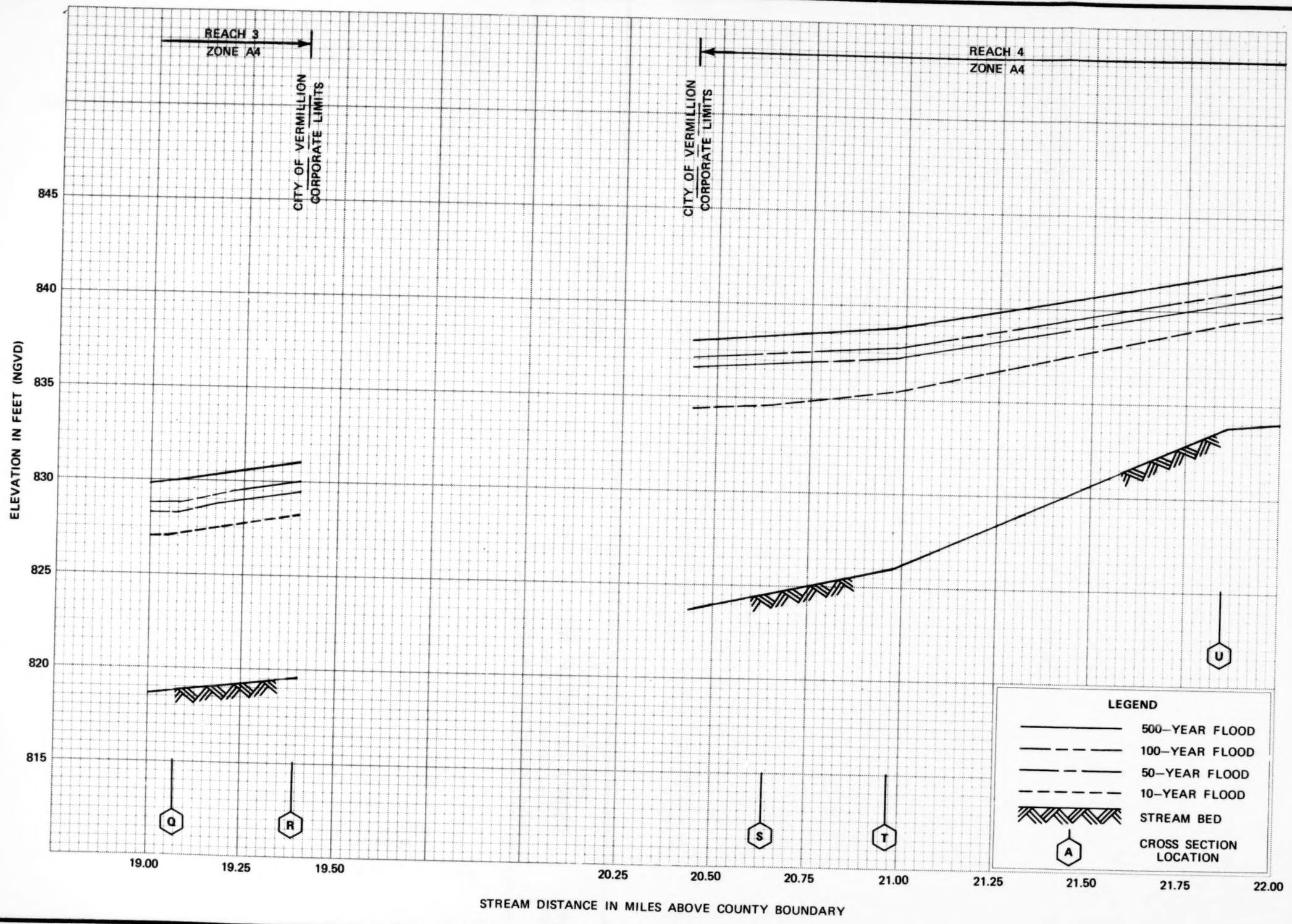


FLOOD PROFILES

VERMILLION RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration
COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

05P



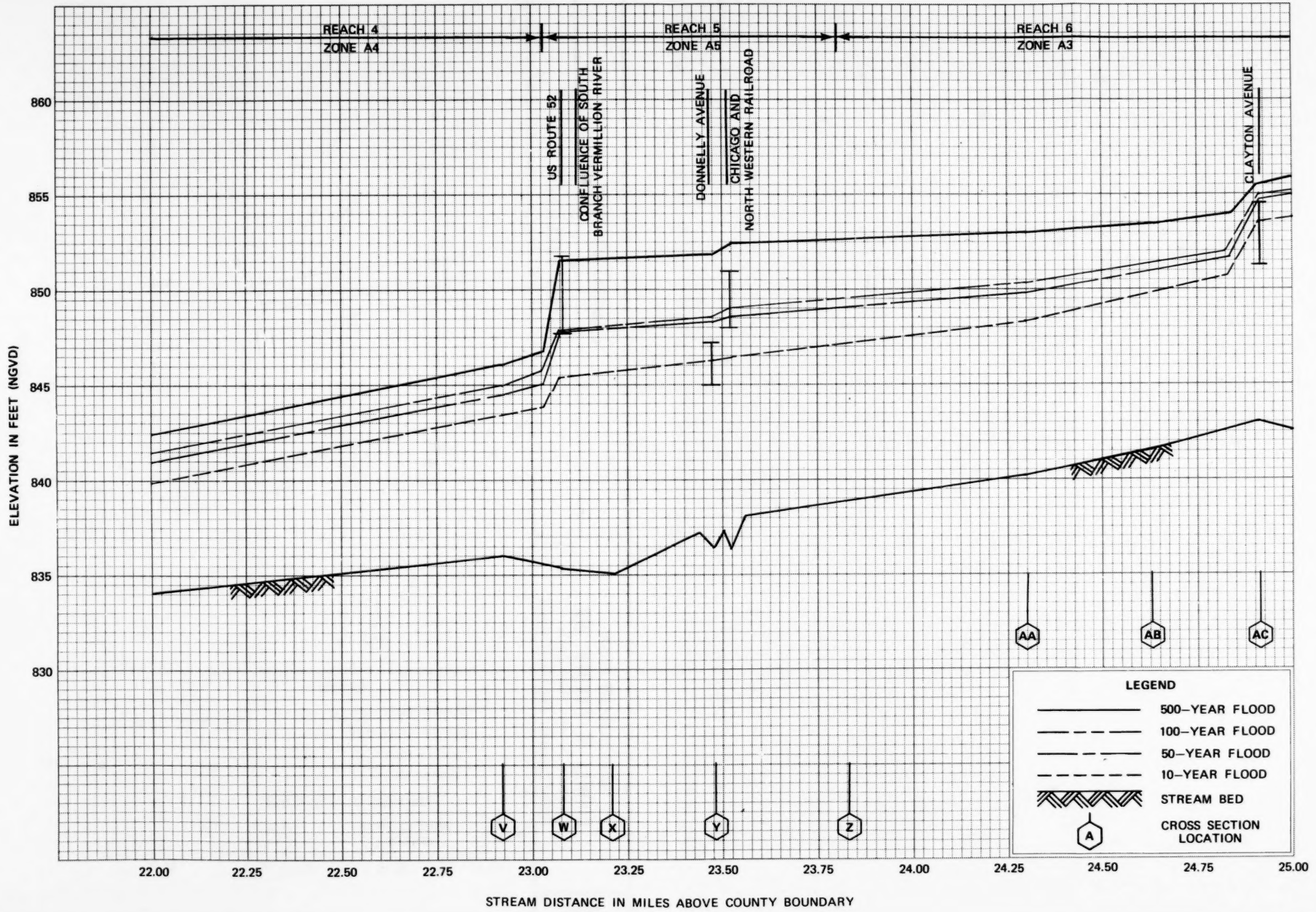
FLOOD PROFILES

VERMILLION RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

06P



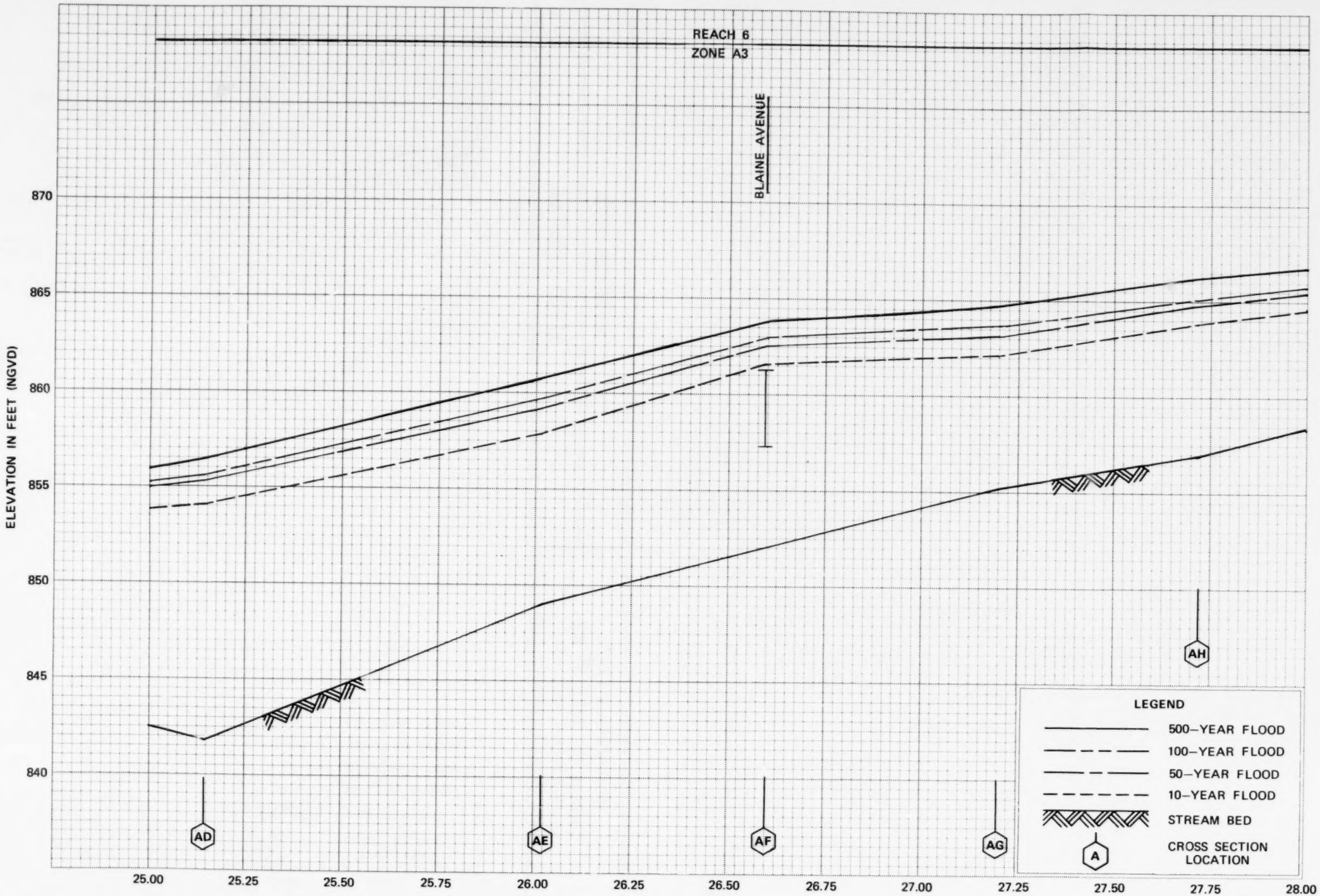
FLOOD PROFILES

VERMILLION RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

07P



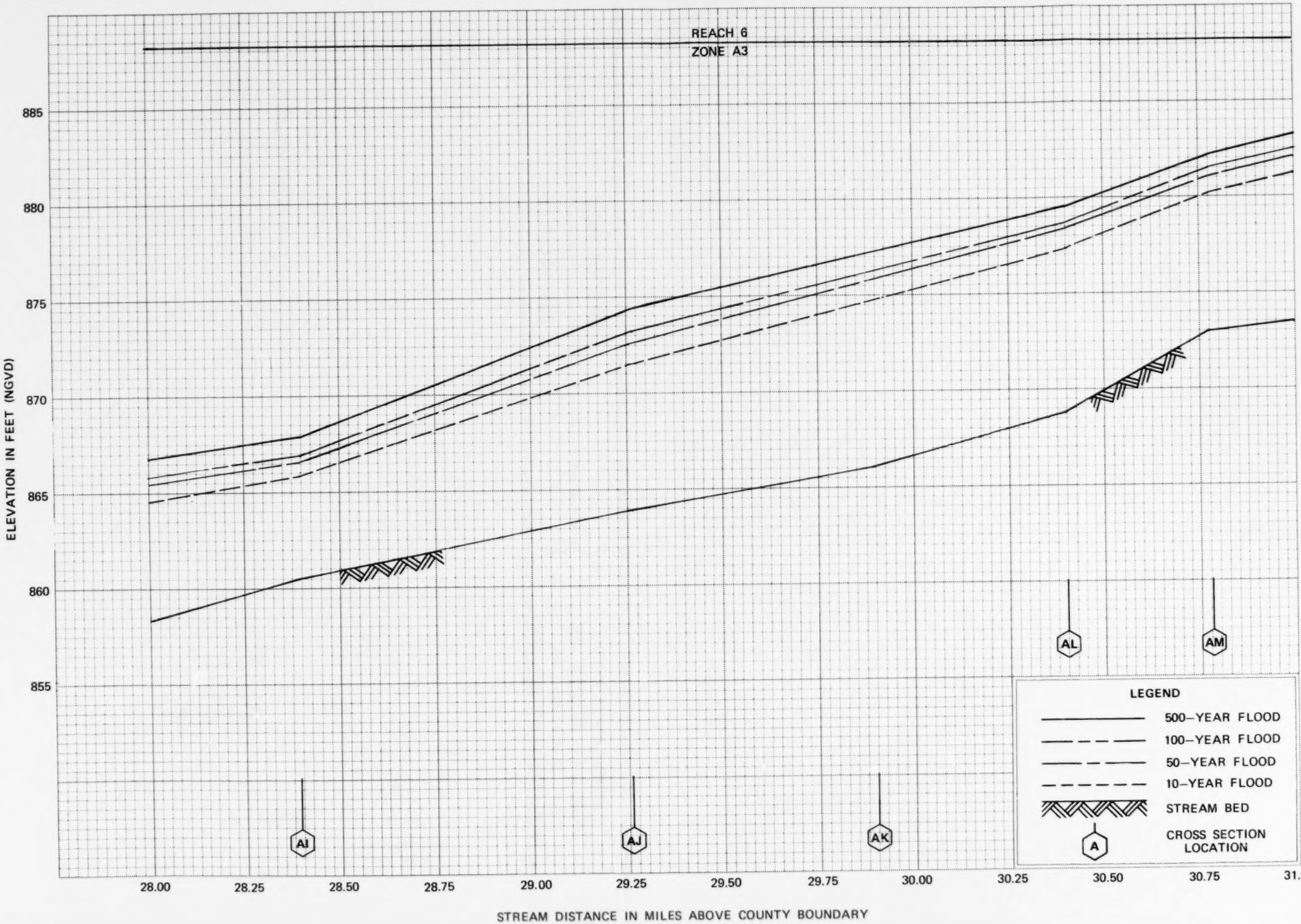
FLOOD PROFILES

VERMILLION RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

08P



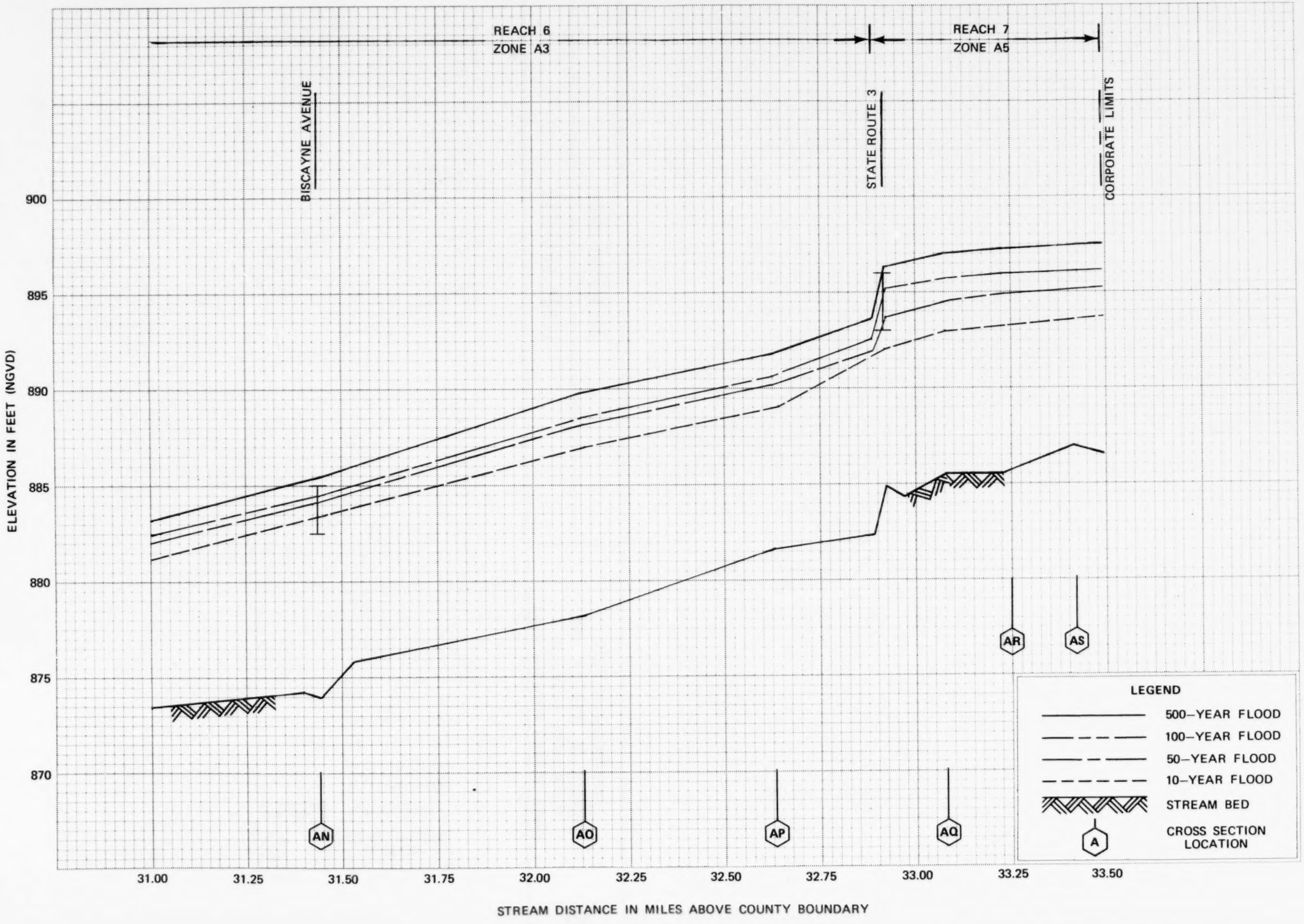
FLOOD PROFILES

VERMILLION RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

09P



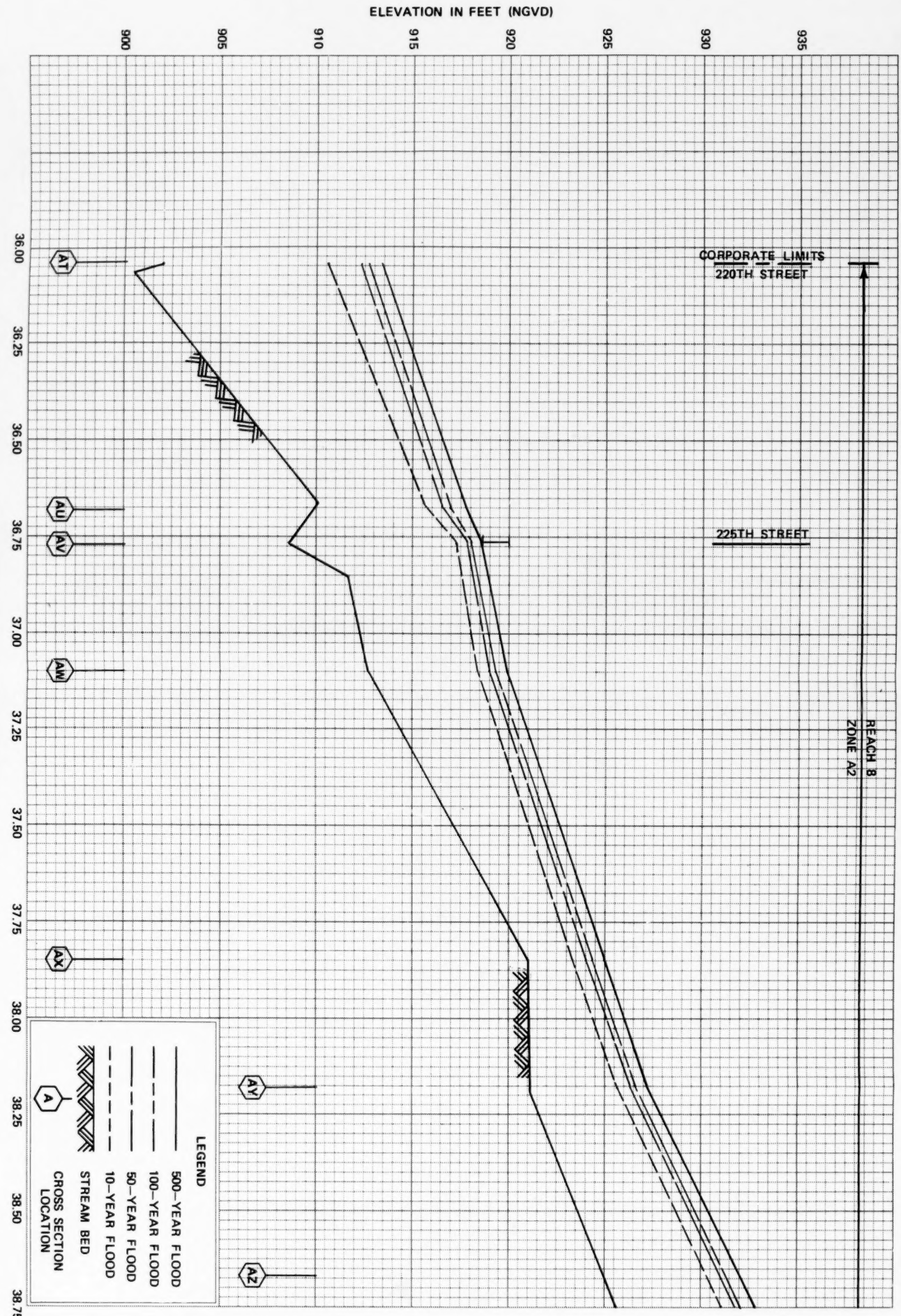
FLOOD PROFILES

VERMILLION RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

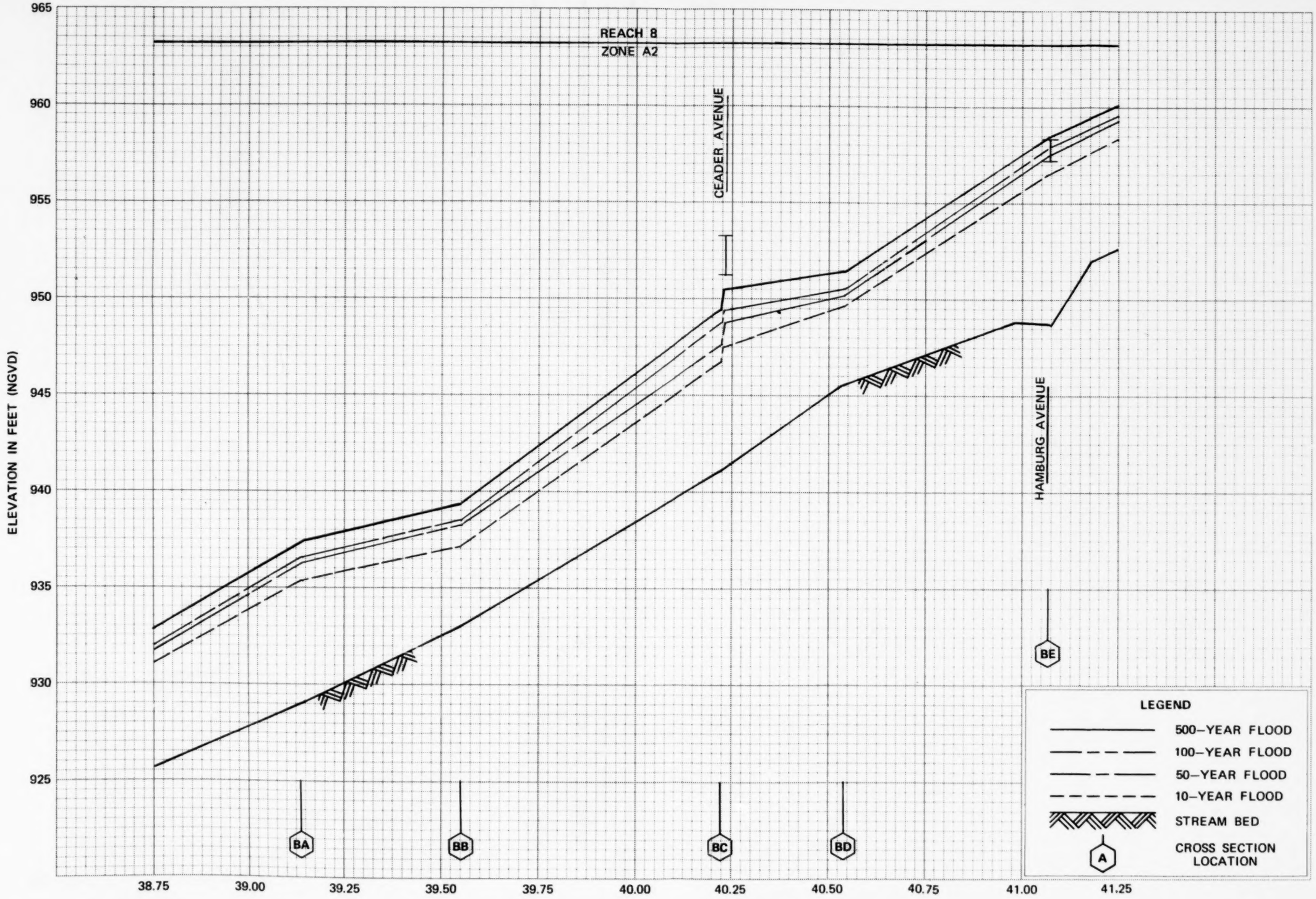
10P



FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration
COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

FLOOD PROFILES

VERMILLION RIVER



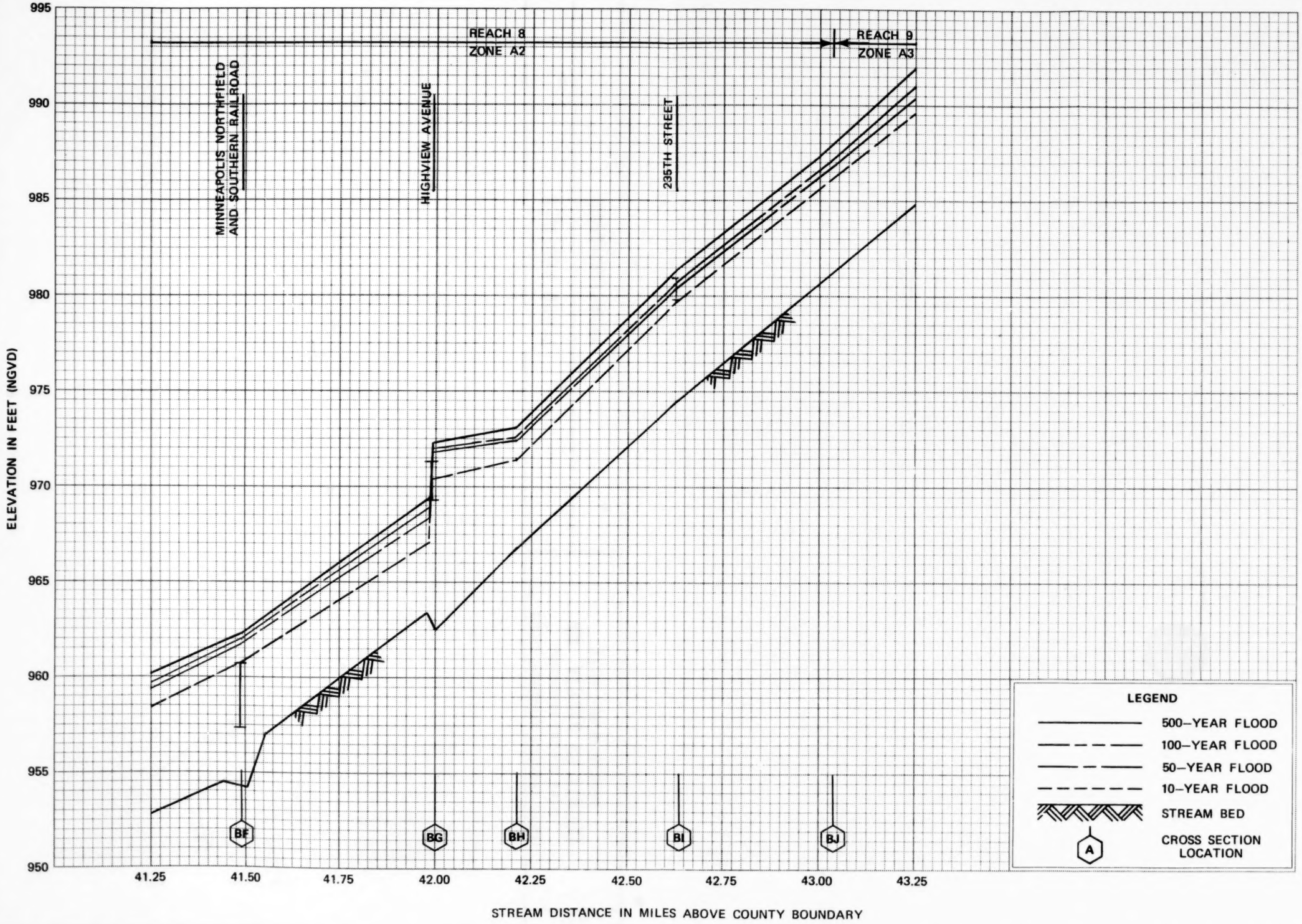
FLOOD PROFILES

VERMILLION RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

12P



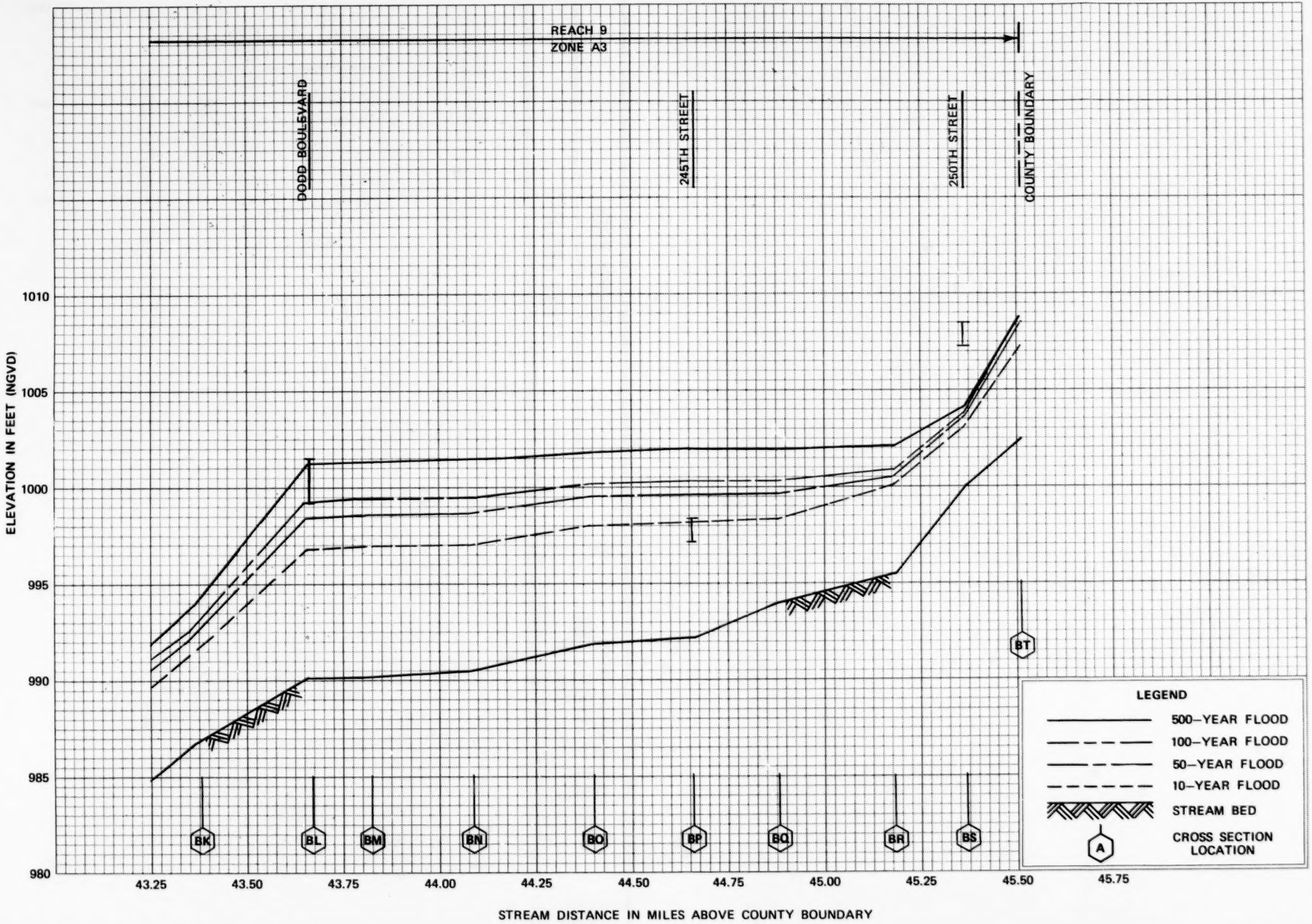
FLOOD PROFILES

VERMILLION RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

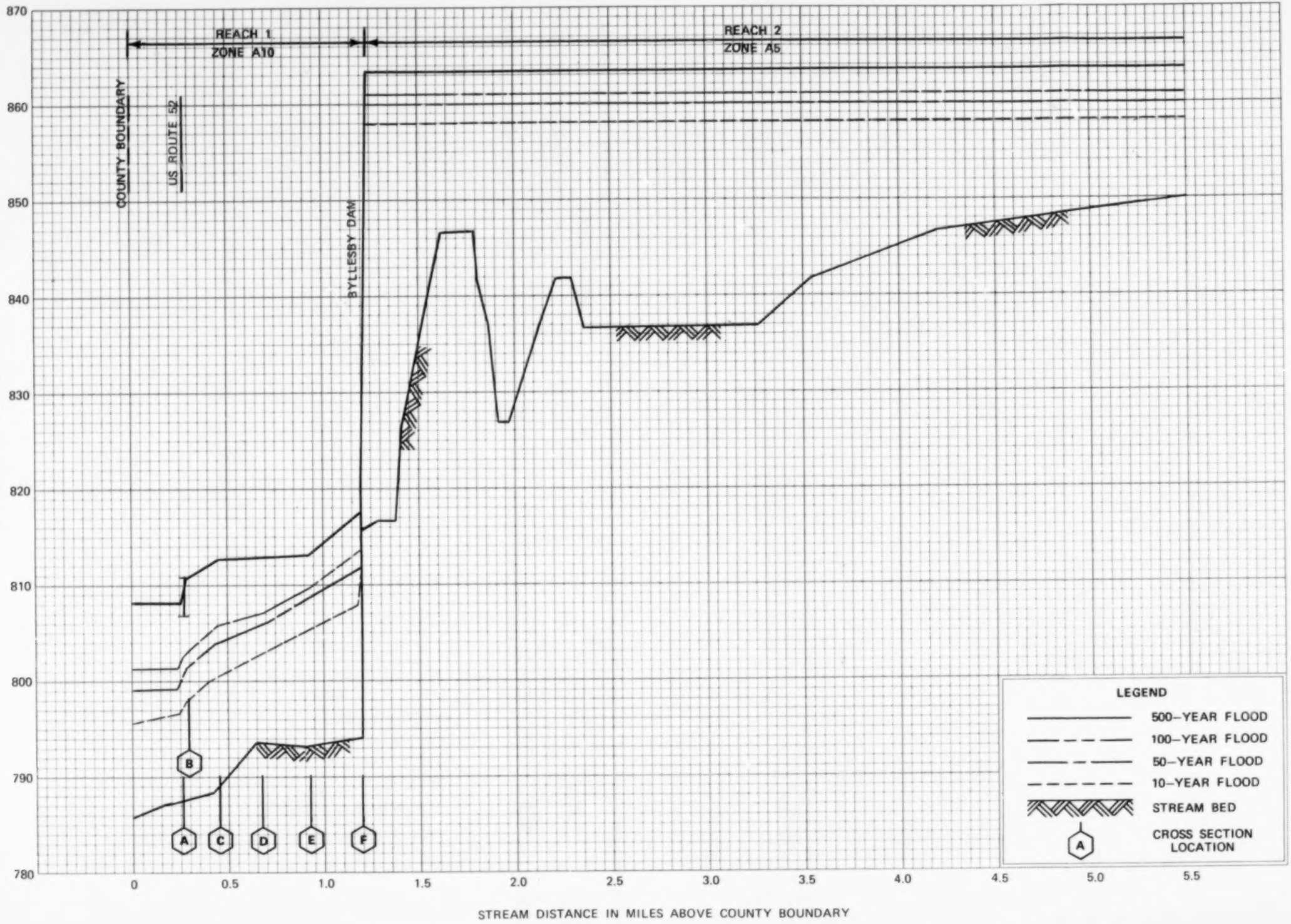
13P



FLOOD PROFILES

VERMILLION RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration
COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)



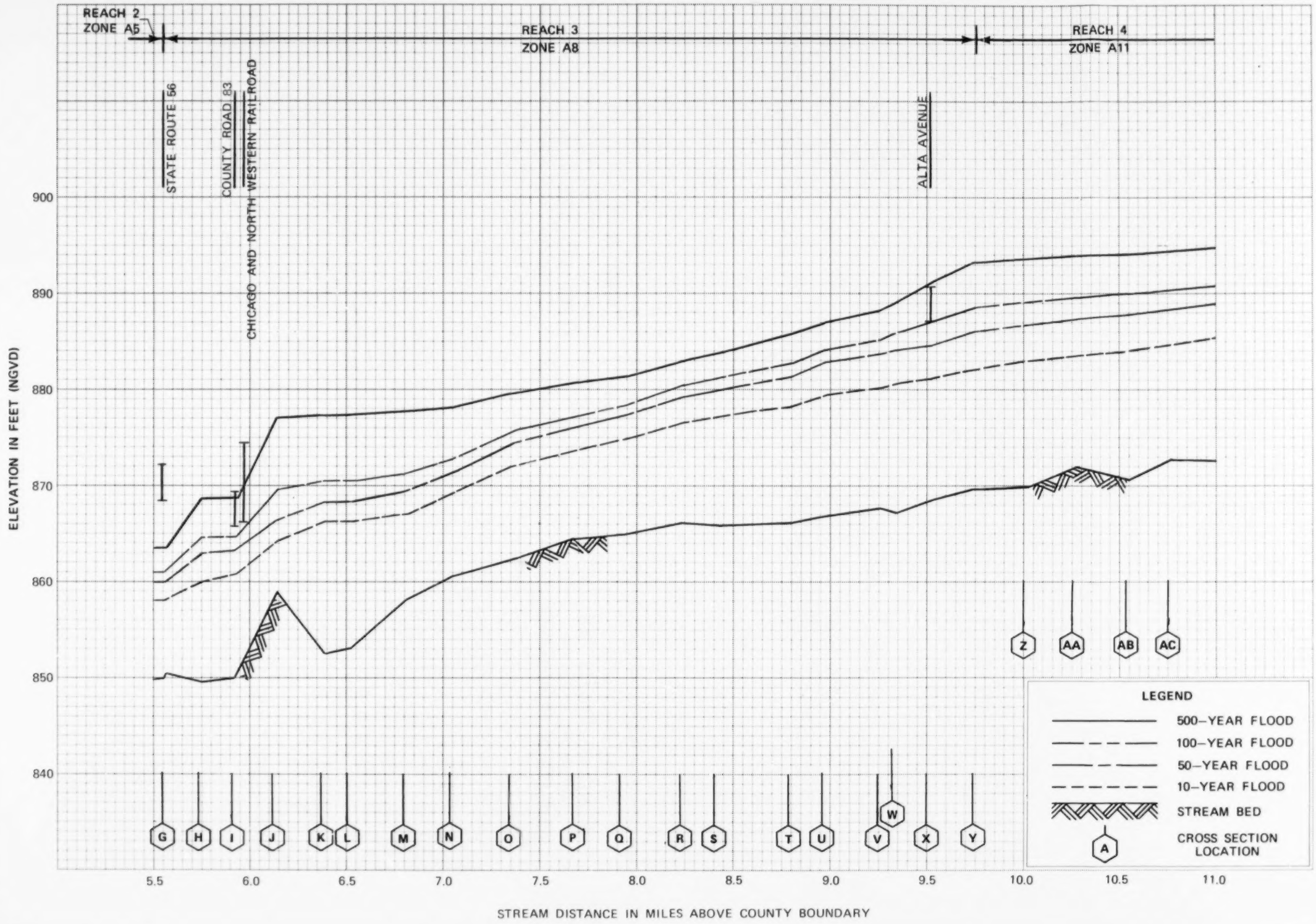
FLOOD PROFILES

CANNON RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

15P



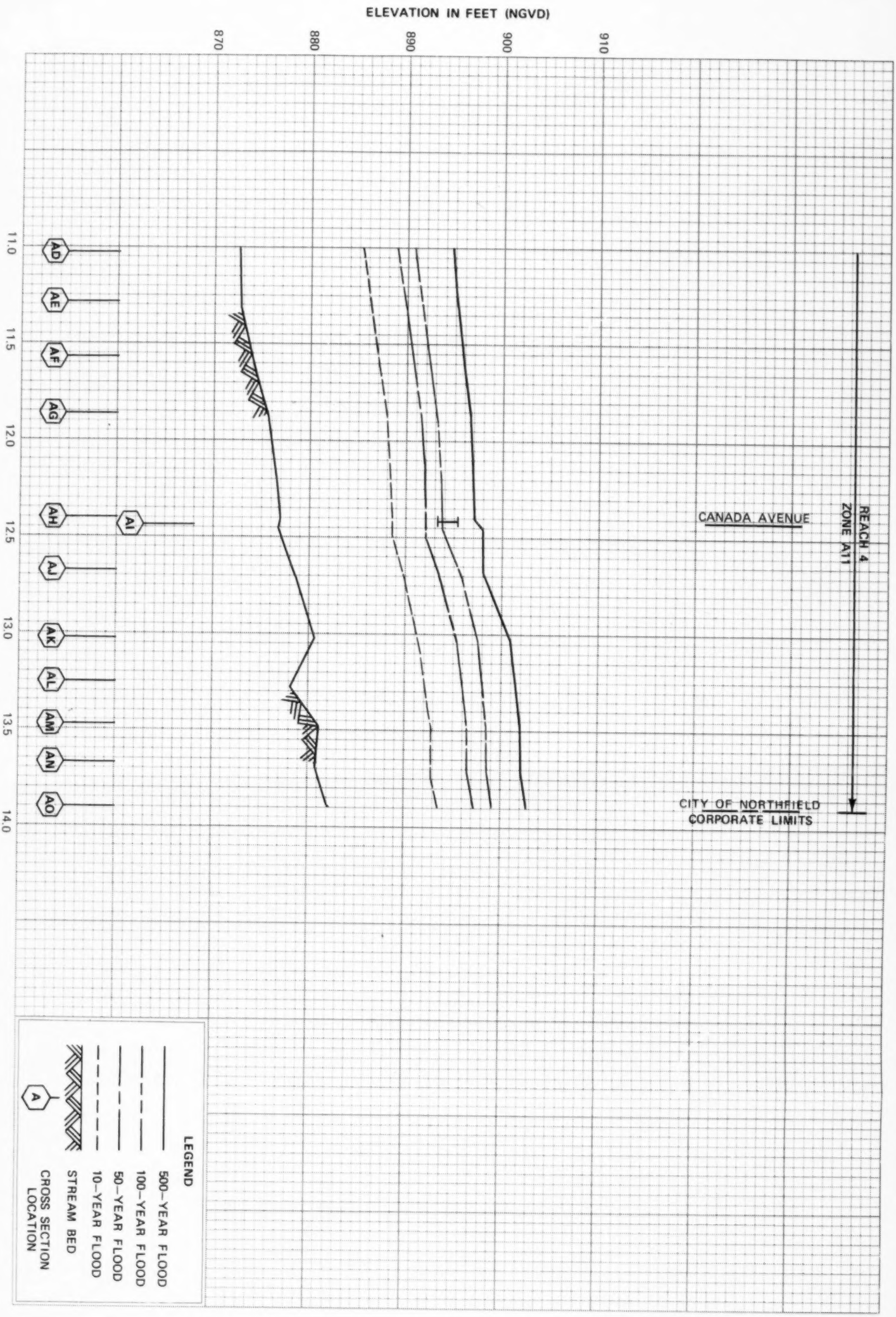
FLOOD PROFILES

CANNON RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

16P



17P

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration
COUNTY OF DAKOTA, MN
(UNINCORPORATED AREAS)

FLOOD PROFILES

CANNON RIVER